

MEETING MINUTES (FINAL)

CITY OF TUCSON HABITAT CONSERVATION PLANS

Technical Advisory Committee (TAC)

Wednesday, September 17, 2008, 1:00 – 4:00 p.m.

U.S. Fish & Wildlife Service, Tucson Field Office

201 North Bonita Ave, Suite 141

Tucson, AZ 85745

ATTENDEES

City of Tucson (COT) Habitat Conservation Plans (HCPs) Technical Advisory Committee (TAC) members present:

Rich Glinski (Arizona Game and Fish Department – *retired*)

Trevor Hare (Coalition for Sonoran Desert Protection)

Guy McPherson (University of Arizona – School of Natural Resources)

E. Linwood Smith (EPG, Inc.)

Other Attendees present:

Marit Alanen (U.S. Fish & Wildlife Service)

Ann Audrey (City of Tucson – Office of Conservation and Sustainable Development)

Sherry Barrett [*present for a brief period to answer questions*] (U.S. Fish & Wildlife Service)

Mike Cross (Westland Resources, Inc.)

Locana de Souza (Arizona Game and Fish Department)

David Jacobs (Arizona Attorney General's Office / Arizona State Land Department)

Chris McDonald (University of Arizona)

Bob Schmalzel (Westland Resources, Inc.)

1. Welcome, introduction, and TAC Charter

2. Review of TAC meeting minutes: August 20, 2008

Technical Advisory Committee (TAC) members approved the minutes with edits from Rich and Guy.

3. Updates

Segment 3 Intergovernmental Agreement

Locana reported that the Arizona Game and Fish Commission recently approved and signed the Segment 3 Intergovernmental Agreement between the City of Tucson (COT) and the Arizona Game and Fish Commission. It will now need to be approved and signed by the COT's Mayor and Council.

Environmental Consultants Request for Proposal (RFP)

Ann said that the selection and contract awarding process had concluded.

Lesser long-nosed bat: Clarification for Avra Valley HCP

Trevor reported that Jamie intended to clarify an error in the Preliminary Draft Avra Valley HCP regarding lesser long-nosed bat habitat. In an e-mail exchange with Ries Lindley, Jamie said that lesser long-nosed bat habitat in Avra Valley is considered movement habitat, and not foraging habitat as sometimes incorrectly stated in the Preliminary Draft Avra Valley HCP.

Desert tortoise model groundtruthing Request for Proposal (RFP)

Trevor said that Jamie sent a revised RFP to the TAC for review based on a change of scope that arose from discussion at the August 20 TAC meeting. Rich asked why more than just tortoise presence and absence was included in the RFP. For the purposes of validating the on-the-ground accuracy of a habitat model, Locana said that if tortoises were not observed in an area during the survey, drawing conclusions about habitat quality would be limited. By detecting sign and habitat components, the model can be validated in the absence of actual tortoises. Locana said that the habitat components used to validate the model would be determined by the selected environmental consultants.

Recent and upcoming HCP-related meetings

Ann reported that Jamie attends the monthly Lee Moore Wash Basin Management Study project meetings and that the project team and others are creating "Rules of Development." Ann said that she provides staff support for the City of Tucson (COT) Resource Planning Advisory Committee (RPAC), which is revising the COT's riparian habitat protection ordinances. This will affect the Greater Southlands HCP since watercourses interweave throughout the planning area. She said that this process might result in the RPAC reviewing a draft riparian habitat protection ordinance by mid-spring 2009. Presumably, this ordinance would replace adopted COT riparian protection ordinances.

Trevor asked how the riparian protection ordinance would affect the Rules of Development as part of the Lee Moore Wash Basin Management Study. Ann said she was unsure given that there are several processes (e.g., the Lee Moore Wash Basin Management Study, Greater Southlands HCP, revised COT watercourse protection ordinance, etc.) occurring concurrently. She said that the COT's ordinances apply to lands within the COT limits. She said that OCSD staff will meet with Bill Zimmerman, the Pima County staff member coordinating the Lee Moore Wash Basin Management Study, to discuss the COT processes currently underway. Trevor said that Pima County should be involved in the RPAC. Ann said that Carla Danforth, a Pima County employee, is an ex-officio member of the RPAC.

A. Flesch's Cactus ferruginous pygmy-owl research (CFPO) proposal

Rich said that he did not think that A. Flesch's responses adequately addressed TAC concerns, and, therefore, he still opposes support of the proposal. Rich wondered how much COT HCP grant funding is currently available for surveys and research, especially considering the proposed desert tortoise habitat model groundtruthing. Trevor said that he thinks the conservation measures described in the Preliminary Draft HCPs will adequately protect CFPO dispersal habitat. In a vote, two TAC members voted against funding the proposal and two abstained. Two ex-officio members also abstained. Trevor said that he abstained because he didn't know enough about the proposal to have an opinion. Guy suggested tabling this item for another TAC meeting.

[Action Item: OCSD staff provide information to the TAC on the amount of HCP grant funds available for surveys and studies].

Other Updates

Trevor announced that there will be a Pima County Science Technical Advisory Committee meeting on September 24 followed by a Monitoring Sub-Committee meeting on the final draft of Pima County's proposed ecological monitoring program.

4. Discussion

Pima Pineapple Cactus: Discuss draft conservation strategy

Ann said that the goal for the meeting's discussion was to inform the conservation approach for the PPC and referred to a compilation of color-coded responses from botanists *et al.* to the questions in the draft Pima pineapple cactus (PPC) conservation framework. Therefore, she said that discussion would focus on reserve design, criteria for those reserves, and decisions that need to be made relative to those. Ann said that, in talking with Jamie, there is a lack of scientific data on this species and so it will be important to fold monitoring and adaptive management into any reserve design.

Ann asked TAC members if the reserve system should include one large reserve or several small reserves. Linwood said that, in terms of the reserve, the bigger the better. He said that he does not see conservation value in many, small (e.g., five acres) PPC reserves scattered throughout the planning area. Trevor said that he didn't know what other TAC members considered as a "large" PPC reserve, but that several square miles would define "large" to him. However, he said that he didn't know if creation of a reserve that large would be feasible in the Greater Southlands HCP planning area. He wondered if the TAC should determine the maximum size that would be possible in the planning area and then "back out" of that to determine how many reserves would be necessary to connect PPC to the northwest and southwest.

Trevor said that a mitigation bank either off-site or in the middle of the planning area is worth consideration. If within the HCP planning area, then a local population would be protected as opposed to mitigation within a conservation bank located in Altar Valley. Trevor asked David what the Arizona State Land Department's stance on mitigation bank location is. David said that no particular areas have been defined. Trevor asked what the difference is between the return on investment for mitigation banks versus residential or commercial development. Mike said that an acre of PPC mitigation is worth about \$6,000 per acre while eight houses could be built on that same acre. Thus, return on investment for a PPC mitigation bank is many times smaller than for development.

In terms of establishing a PPC conservation bank in Altar Valley to mitigate for development within the Greater Southlands, Trevor said that any possible genetic differences, although currently undocumented, between the PPC in the two valleys make this unacceptable to him. Chris said that if there is no genetic difference now, it does not mean that there will not be differences in the future if the two populations are isolated. Rich said that it appears that there is no viable linkage to the west because of the location of 1) Sahuarita's proposed annexation, 2) Tohono O'odham reservation lands, and 3) development along the Ajo Corridor. In that regard,

the “Backwards L” shape – the easternmost and southernmost lands in the HCP planning area – shape is not functional. However, Rich said that the Santa Rita Experimental Range (SRER) south of and adjacent to the “Backwards L” has sections that contain PPC. He said that he doesn’t think looking at the “Backwards L” will do any good if there is no link to the west. Trevor said that the land between the SRER and Interstate-19 within the Town of Sahuarita’s (Sahuarita) limits is a consideration. Guy said that the distance is about 4 miles. Locana wondered if the lands west of and adjacent to the SRER had been surveyed for PPC [*Action Item: OCS staff inquire with USFWS staff as to whether or not lands west of and adjacent to the Santa Rita Experimental Range have been surveyed for PPC*].

Ann asked David about the possibility of the SRER serving as a PPC reserve site. David said that he couldn’t think of any problems with that unless there was a conflict with what the University of Arizona is doing on those lands. Marit asked how mitigation would occur within the SRER and what level of PPC protection would occur that is not occurring now.

Trevor said that knowing the specific amount of possible impact by HCP Covered Activities within the Greater Southlands will determine how many acres need to be set-aside. Trevor noted that the USFWS Section 7 biological opinions he has read require one-to-one (i.e., one acre conserved for every acre of PPC habitat destroyed) mitigation.

Rich said that Pima County’s PPC model indicated that the SRER contains high value PPC habitat. Mike said that Westland Resources, Inc. conducted biological surveys on a property immediately north of the SRER containing higher than normal densities of PPC. Rich suggested that mitigation for impacts within the HCP planning area contribute to a PPC conservation bank as close to the SRER as possible, using a one-to-one acreage ratio. He said that the PPC population genetics would be substantially preserved because of the high density of PPC on the SRER. Rich added that any mitigation requirements developed for the HCP should explicitly state that the conservation bank should be located as close to the Greater Southlands HCP planning area as possible and contributions should be made at the time they are needed. In other words, if there is a PPC conservation bank in Sahuarita, impacts in the Greater Southlands should be mitigated there as opposed to Altar Valley.

Ann said that it sounded like a PPC corridor would need to be described and that the COT should require mitigation funds to be spent within that corridor. Marit said that it is important to consider what is taking place in Sahuarita now in terms of development. She said that given Sahuarita’s development timeline, the COT might not be able to wait. If the Southlands won’t be developed for another 20 to 50 years, there may not be any PPC habitat left in Sahuarita with which to create a PPC conservation bank.

David said that, in terms of geography, he wasn’t sure why Sahuarita would be considered an important place for a PPC conservation bank. Based on what David was saying, Ann wondered about linking to Altar Valley through the Canoa Ranch area. Ann wondered if Canoa Ranch was the only land east of Interstate Freeway 19 that didn’t have obstructions, saying that one has to travel that far south to get beyond residential development.

Rich asked Bob if he knew where the good populations of PPC are within its range. Bob said that he had not seen high densities of PPC in some areas of the Greater Southlands, but that there is already a mitigation parcel set aside for the Mirasol Development. He added that it is only about an acre of land, but contains 80 to 100 naturally occurring PPC, with very strong recruitment. In the SRER, PPC is distributed along the lower half of the elevation gradient. Bob said that a very large alluvial fan extends from Sycamore Canyon. He said that he has not explored it, but in terms of the geomorphology and soil type, it is ripe for supporting dense patches of PPC. In addition, Bob said that Madera Canyon has a very large, early Pleistocene, red-clay alluvial fan. Bob said that he anticipated observing many PPC there, but only two or three were observed within two to three square miles.

Bob said that an unnamed cactus weevil of the genus *Gerstaeckeria* destroys PPC and is present in the Greater Southlands HCP planning area. So, if large numbers of plants are established and grow in proximity to the weevil, it will walk in, destroy individuals, and decrease the PPC population very quickly. Therefore, Bob said that one advantage of a visible disconnection between PPC patches is isolation from the weevil, which can allow conditions for high densities of PPC to establish.

Bob said that as one crosses over to the Sopori Wash, he has been on the flood terraces of the nearby private land and they support high densities of PPC. These are Pleistocene floodplains with clay soils. Bob said that he also knows the location of higher than average densities on the south side of the Black Hills.

Along the east side of the Santa Cruz River, Bob said that there are PPC colonies along the escarpments of the alluvial fans cut back by the River. However, he said that as development threatens these areas, transplanting PPC offsite is common. Given these threats, Bob said that it would benefit the PPC if the COT can offer some arrangement – such as selling conservation credits – so that developers can be convinced to set-aside some of the prime soil types along the edges. Bob added that seeds within the PPC fruit eaten incidentally to the jackrabbits' main forage plants are defecated in proximity to where jackrabbits sit digesting their meals. Jackrabbits forage in the washes and then digest on the ridges, which is also where clusters of PPC occur. Bob said that in the context of soil and directed seed dispersal, it is a case of positive feedback.

Rich wondered if isolating clusters of PPC to prevent weevil decimation would preclude floral visits from the solitary, ground-nesting bee *Diadasia rinconis*. Bob said that *Diadasia rinconis* is one of the most abundant bees in the Sonoran Desert and is, therefore, ubiquitous. And, while *D. rinconis* flies, the weevil walks. Bob said that the one-square mile Corona de Tucson development has cut off the red clay alluvium to the north and so PPC patches are now isolated. Thus far, Bob said that he has observed weevils to the south, but none to the north of the development. Locana asked if the weevil only eats PPC to which Bob said that he has only found it on PPC. He said that the weevil has been recovered both in the Altar and Santa Cruz Valleys, but only at relatively higher elevations of PPC habitat.

Trevor said that Pima County will be very important in terms of connecting PPC in the Altar and Santa Cruz Valleys. He said that Pima County is in the process of buying part of the Sopori

Ranch. Marit asked if the TAC was proposing to not protect PPC habitat in the Greater Southlands, with off-site mitigation being the primary conservation tool. Trevor said that the discussion shifted to off-site mitigation because of doubts that all of the impacts could be mitigated within the HCP planning area. However, he said that he thinks it is important to have some sort of reserve system through the “Backwards L” that connects to the SRER.

Trevor said that there is still uncertainty over the size of a reserve or reserves within the “Backwards L.” He said that the habitat needs of jackrabbits would be good to know and whether or not there is a threshold of urbanization at which any potential habitat no longer supports jackrabbits. As an anecdotal example of the potential impact of urbanization, Trevor said that he lives near Reid Park and has never seen a jackrabbit in the area, although he sees javelina and snakes. Trevor said that the jackrabbit could be considered an “umbrella species.”

Ann asked about the development density that had been discussed for the “Backwards L.” Trevor said that the current conservation program calls for adherence to Pima County’s Conservation Lands System. So, where lands are considered “Biological Core” there is an 80% open space requirement. Ann asked if having reserves was necessary given this requirement. Mike said that even though there is an 80% set-aside requirement, it does not mean that 80% of a particular piece of land will be set-aside. He said that what often happens is that mitigation credits are purchased someplace else. Trevor concurred and said that the 80% set-aside on the particular piece of land is what Pima County prefers, but this isn’t always the case. Therefore, he said it would be important to “hard line” some areas as part of a PPC reserve. Guy suggested that perhaps a certain percentage of set-aside should be required to occur on-site for all lands within the planning area. This is because there is not enough information on the PPC to inform a reserve design. Marit asked if Pima County’s Conservation Lands System (CLS) only applies as a condition of rezoning.

Trevor asked about zoning and Arizona State Land Department (ASLD) lands. David said that lands within the Greater Southlands HCP planning area are mostly zoned as Suburban Ranch (1 house per 3.3 acres). When the land is prepared for auction, re-zoning discussions start. He said that when this will occur is unpredictable.

Marit said that since Guy thinks that the TAC does not know how to design a reserve for the PPC, she suggested that it would be good to address the question of how the TAC values on-site versus off-site mitigation. She suggested that if on-site mitigation is preferred, that the mitigation lands should be designated as public, natural undisturbed open space, as opposed to private yards. She added that management costs are likely to be higher if conserving in dispersed clumps around the planning area as opposed to one, large area.

Ann asked Bob if he had a map of where the weevils had been detected to date. Bob said that he is currently working on a manuscript and would prefer to share that information with the TAC when it is published, which is likely within a half year. Bob said that the distribution of the weevil depends on demographic attributes of the PPC. The PPC needs to be on a site where seedlings establish at a high rate, year-after-year, allowing the weevil to predate the plants. One adult PPC can produce 30 to 40 weevils and, with dispersal and breeding, they can decimate a PPC patch quickly. The weevils live beside the plants for the rest of the year until they are ready

to lay eggs. So, it is only a particular soil type that supports the weevil. Bob said that lowland areas do not have the necessary clay in the soil required by weevils and so weevils die from desiccation before emerging in the spring. Bob said that the adults lay eggs on the stem, chew into the stem, and oviposit. The larvae feed on the inside of the stem during the winter and, around March, drill down into the soil. They drill holes, which are roughly the diameter of a pencil, about an inch to an inch-and-a-half into the ground where they pupate. He found a *Gerstaeckeria*, perhaps a different species, feeding on *Coryphantha* over in the Chisos Mountains of Texas. Bob said that the weevils probably live a few years according to a weevil expert he spoke with. If eggs are laid in November, adults are ready to emerge in May.

Trevor said that it might be good to also consider the life history attributes of the jackrabbits and look at home range and dispersal behavior. Bob said that jackrabbits were present during visits to the one-acre parcel with 80-plus PPC. This was four or five years ago. Since that time, Bob said that the landscape has filled in with prickly pear cacti and the cattle have been removed. Bob said that he thinks that prickly pear cacti have increased beyond the threshold of density suitable for jackrabbits. He said that although jackrabbits are still nearby, their dung is no longer visible in the same abundance. Moreover, mesquite seedlings are no longer suppressed in that area. So, in terms of reserve design, Bob said that there is an advantage to a small, garden plot reserve so that prickly pear could be thinned as needed. A noteworthy amount of “gardening” – removing mesquite seedlings and prickly pear juveniles – would be required and said that he would suggest that it occur on smaller parcels of high-quality habitat.

Trevor asked Bob if jackrabbit life history has been thoroughly studied. Bob said his comments are based on his own observations, which are easy to make based on looking at jackrabbit fecal pellet presence and absence in an area. Bob said that to evade predators, jackrabbits must maintain vigilance. When they see a predator, they must run fast in a straight line, and at the last moment, they duck behind a shrub. How long a straight-line trajectory can be made is probably a key point. Near the Corona de Tucson development, there are areas where the vegetation has closed in completely with prickly pear. In those areas, he said that he would anticipate finding low densities of jackrabbits and high densities of cottontail rabbits. The difference between these hares and rabbits is that it looks like cottontail rabbits eat the fruits of PPC but, unlike jackrabbits, they grind up the seeds. Bob said that he has recovered thousands of cottontail pellets and has yet to find an intact PPC seed. In contrast, he has found intact PPC seeds in jackrabbit pellets. This will be documented in a manuscript that Bob said he is preparing for publication. Rich asked Bob who pays his PPC research. Bob said that his company, Westland Resources, Inc., pays for some of it, although a lot of it is his own time.

Chris said that reserve design will require a balancing act since too few prickly pear will lead to too few bees. Yet, if there are too many prickly pear cacti, then there won't be enough seed dispersers present. He said that he thinks small PPC parks are great, but there also need to be large reserves with connectivity.

Ann said that she did not hear consensus from the TAC on the description of a PPC reserve. Given that, she said that factors to consider include target densities of prickly pear. In terms of jackrabbits, Ann said that it sounded like distance from urban areas may be important. Trevor said that jackrabbit habitat structure may be another component to consider. Rich said that soil

type should also be considered. Bob said that older soils tend to constrain mesquite growth, as there is usually caliche substrate or decomposed rock near the surface.

Bob said that he agreed with what Chris had said earlier about the need for a variety of preserves. In terms of jackrabbits, Bob said that, to his knowledge, Arizona Game and Fish Department staff members have not studied jackrabbits thoroughly. The only study of jackrabbit dispersal or movement that he was aware of was published in the Journal of Wildlife Management. It was a long-term effort in Northern Utah in which a large number of jackrabbits were radio-collared. The study looked at large, long-term movements, not daily movements. Of the many radio-collared jackrabbits, a small percentage moved more than 10 km. So, a lot of jackrabbits stay local. As an aside, Bob said that PPC plant and fruit characteristics are such that they are good for pronghorn dispersal. However, local pronghorn populations disappeared 150 years ago. This would have been the species he would suspect was responsible for intervalley dispersal of PPC seeds.

In terms of soil characteristics, Trevor said that much of the information on soil types for PPC has been captured in the Preliminary Draft Greater Southlands HCP. However, he recommended double-checking that all the information is there.

Ann asked about mesquite densities. Bob said that he doesn't have a general recommendation, but that in the areas with high densities of PPC, maintaining 50- to 100-meter mesquite-free areas along ridgelines would be advantageous. Trevor recommended this strategy for active management of any reserves created, keeping mesquites where they belong in the washes.

Trevor said that the weevil dynamics should be included as a reserve design factor, such that any reserves established in relatively higher elevations with clayey soils should consider managing PPC clumps further apart to avoid decimation by weevils. Bob noted that those PPC patches with weevils present he considers robust because the PPC are able to withstand weevil depredation.

Chris said that most areas of the PPC range he is familiar with do not support 80 plants per acre and that this density is anomalous to his findings. Bob said that he knows of areas where there are 80 plants per 40 acres but that he regards one plant per acre as high density. These are areas he would expect weevils to be if they are at higher elevations. Bob said that they are finishing a biological assessment for Fagen Ranch, which had high-density patches of PPC with the weevil present.

Guy said that it sounded like the distance these weevils walk is unknown, making it difficult to know how the weevil would inform specifications for a reserve system. Bob said that this could be studied. Ann said that the distance between patches is to be determined. Trevor said that there might be an evolutionary function the weevil contributes to that we don't want to preclude.

Bob said that weevils are often used to control non-native, invasive plant species. However, for this to be successful, it will have to happen very slowly since this little insect must walk and find each individual plant. So, unless PPC floral or fruit odors are an attractant, Bob said that he doesn't see how weevils are finding PPC, except by chance.

In addition to elevation, Rich suggested that slope be a consideration for reserve design as it sounds like PPC occur on “benches.” Bob concurred. Marit said that less than 15% slope is a good target, within a varied landscape.

Ann mentioned the Altar Valley connection south of the Sierrita Mountains. Chris said that the only known, low-elevation connection between the Santa Cruz and Altar Valleys is north of the Sierrita Mountains. The southern side of the Sierrita Mountains is poor quality PPC habitat. Trevor mentioned a question he had about the viability of the northern corridor in terms of what Pima County is doing. He said that Jamie Brown (OCSD) responded to his question and provided notes to a meeting between Julia Fonseca (Pima County) and him. According to the notes, Pima County is targeting the lands north of the Sierrita Mountains for a pollination corridor. Trevor read one of the bullet items from the meeting notes:

“A corridor linking the Altar and Santa Cruz Valleys has been considered important by USFWS staff and PPC experts. Working with these groups, Pima County identified the corridor north of the Sierrita Mountains and a corridor south of the Sierrita Mountains. The one south of the Sierritas has not been surveyed for PPC and may not be viable, so the one north of the Sierritas is considered more important.”

To Ann’s list of PPC reserve factors, Marit suggested adding something like “working with Pima County to maximize the area of the reserves” so that any COT reserves consider proximity to Pima County PPC reserves or open space. With regard to Pima County’s requirement of a 10-year PPC study as part of the Swan Southlands development, Trevor asked if USFWS staff know if the study seeks to answer questions similar to those of the TAC. Marit said that she didn’t know [*Action item: USFWS staff get information on the research questions the Swan Southlands PPC study – required by Pima County – seeks to answer*].

Trevor mentioned Chris’ recommendation for a reserve with at least 200 individuals and hundreds of hectares in size. Chris said that the 200 minimum was based on a genetic study and provides a bare minimum for a viable population. Five hundred individuals would be required if there was no connectivity and the population stands alone. Chris said that these numbers refer to all organisms in general and are based on conversations he had with two geneticists.

In reference to Chris McDonald’s statement that 1 kilometer is the maximum pollination distance for the main pollinator of PPC, *Diadasia rinconis*, Bob said that *Diadasia* are probably traveling farther than 1 km. Bob said that Chris’ study documented the movement of powdered cellulose between flowers. To ask the question “How far are the bees going?” requires a different kind of experimental design since powdered cellulose is too dissimilar to pollen. Bob said that, unlike powdered cellulose, pollen has pollen kit, which contains lipids, and the hairs of bees are lipophilic. This creates a lock and key system where the pollen adheres very well to the body of the bee. With most powdered cellulose studies Bob is familiar with, investigators are studying movements of powdered cellulose within a few meters for a population of very dense plants, such as larkspur. In terms of Chris’ study, he said that while it is a first and interesting step, it is probably not definitive in terms of how far pollen is going. Bob said that this distance matters when the problem or consideration is one of inbreeding or genetic movement. This is because it

doesn't take every pollen grain hitting every stigma of every flower in a patch, but rather how far exceedingly rare events occur to determine the distance of extremely rare outcrossings. Bob said that his guess is that these rare outcrossings are occurring at phenomenal distances.

Marit said that right now, the TAC needs to base decisions on available information and, in this case, that information is from Chris' study. Bob said that that is what the USFWS is constrained in doing, but as a biologist, he can say that that is an interesting first step. However, he said he disagreed with the conclusions that could be drawn from it. Chris said that in studies more recent than his, investigators looked at the decoupling of the dye and pollen and they found that it is on average, about 50 percent different in worst case scenarios. In best case scenarios, it matches 90 percent of the time. He said that he doesn't know the system, but assuming 50 percent, the maximum distance would need to be doubled to 2 kilometers. On the other hand, Chris said that there are many published studies where researchers track individual bees and the bees are almost uniformly moving less than 2 kilometers. There are very rare, long-distance outcrossing events. Chris said that, genetically speaking, more than an occasional extreme outcrossing is needed. He added that where the mid-point between extreme and normal outcrossing occurs should be the target distance. However, he doesn't know what this distance is. Chris said that researchers, in general, feel that the method of using powdered cellulose is decently robust. The bees, given their body size, need to fly from a nest to wherever they are going many times a day and therefore, can't fly too far. He doesn't know about dispersal distance of juvenile bees, but they wouldn't have much pollen on them anyway. He said that it is kind of a leap frog event, where there is one plant followed by the next plant. But, Chris said that nobody has taken a 1 km concrete pad and tracked whether or not the bee travels farther, or travels farther and then does a U-turn.

Bob said that he collected a lot of *Diadasia* this summer and what he was shocked to see was that they were newly emerged bees. The hair on the heads of the females was immaculate. As the bees begin digging, they lose that hair very quickly. Bob said that he did not observe a single chip on the wing. These are the bees that pollinate Pima pineapple cactus. He added that not only does one find *Diadasia* spp., but also another native cactus bee – *Idiomelissodes duplocincta* – on chain fruit cholla just a couple of hours later at the end of the day, after visiting PPC. Bob said that, *Diadasia*, as far as we know, nest in aggregations, although this is still being studied. He said that these aggregations are stable and are likely to persist over a number of years. They produce their own parasitic wasps that can depress the numbers of successful broods or bees produced. Bob said that some aggregations were described well enough in the 1970s that one could return to those sites today and see if they are still present. Bob said that it would be good to identify the locations of these aggregations in the Greater Southlands, as they are likely to be meaningful, not only now, but also decades from now. These would be good to protect, even in small patches. Bob said that a researcher out of the University of Michigan identified the location of these aggregations. She had study areas near Saguaro National Park east, near a stock tank near the Black Hills, and north of Oracle. An aggregation can be detected by encroaching on the roaring sound coming from high densities of bees. These aggregation sites would be good not only for study, but also for marking bees. Bob suggested marking bees there, in the study population of PPC, or in a surrogate population of chain fruit cholla. This increases the amount of time that the pollinators could be studied. Instead of just the three to five days when the PPC

is blooming, now one could work with the pollinators any late afternoon. And, if one knows the location of the aggregations, one could do some very interesting mark and recapture studies.

Bob said that Chris was using the central place foraging model in his study in which it is assumed that the bees must come back to one place. This is why he asked Chris if he was referring to bees in general or *Diadasia* specifically. Chris said that those bees are not laying down nests when PPC flowers nor are they emerging too much when PPC is flowering. When PPC flowers, Chris said that it is almost the only plant in bloom. In response, Bob said that chain fruit cholla blooms at the same time as PPC. He said that chain fruit cholla keeps the bees active.

In terms of the Native Plant Preservation Ordinance (NPPO), Ann said that comments from the PPC botanists and others seem to indicate that there are concerns with how the NPPO deals with PPC. Specifically, there are concerns about PPC size thresholds for documentation as part of the NPPO plan and the lack of protection of plant species important to PPC, such as chain fruit cholla. Guy said that instead of the focus being on whether or not a plant is 4" in diameter, he thinks the focus of an NPPO should be on PPC demography.

With regard to the NPPO and cactus size, Bob said that when doing a field survey, those in the field generally do not find sub-adults if they are performing large, 40- or 80-acre, comprehensive surveys. They generally don't see the little plants unless crawling on hands and knees under a fence. However, he said that he doesn't know about the justification for the 4" diameter threshold. *[Action Item: OCSD staff ask other COT staff if they have documentation or knowledge of the justification for the 4" diameter threshold used in the COT's Native Plant Preservation Ordinance].*

In terms of transplanting PPC, Bob said that in his experience, if one waters both small and large plants, they survive. He said that he has PPC that he transplanted last spring, which then flowered last summer. This year, he said that these PPC have a full complement of fruits. However, he watered them twice a week for two months the first year with no subsequent watering. He said that PPC will die if one transplants them and does not water them. Chris said that if one transplanted them in November, presumably, he would want to water them longer. Bob said that if there are many winter precipitation events along with that initial watering, he said that he would stop watering them. He added that if the PPC look stressed, he would also start watering again.

Marit said that, with the 30% set-aside option of the NPPO, there appears to be a trend to protect riparian areas as the set aside and PPC transplant locations, which may not be the best habitat for the species. She referenced Guy's remark about the current NPPO emphasizing protection of individual plants and not plant habitat. She said that while the individual PPC may be transplanted and watered, the PPC habitat is ultimately lost. Trevor asked if the 30% set-aside as part of the NPPO could be located in areas considered "Protected Riparian Area" per the COT's riparian habitat protection ordinances. Ann said that the two overlap. Trevor said that the issue of appropriate habitat protection under the NPPO applies to all endangered or threatened plants (e.g., needle-spined pineapple cactus) and not just the PPC.

Trevor wondered how the NPPO applies to the HCP and whether or not the HCP trumps the NPPO. David asked about a hypothetical situation in which there is no federal nexus for a development and the development is within endangered or threatened plant habitat, but not animal habitat, and if an ESA Section 10 Incidental Take Permit be required by USFWS. Marit said no because the ESA treats plants and animals differently. In terms of grading, Trevor said that an NPPO Plan must be completed prior to COT issuance of a grading permit. Trevor said that the COT discretionary action has to do with the zoning. He said that as land is annexed and goes up for rezoning to higher density development, the COT can impose conservation requirements as part of a rezoning condition. However, he said it will be important to also effect conservation on non-rezoned lands that will have homes (e.g., one residence built on 3.3 acres). Trevor said that he thinks the NPPO will need quite a bit of revision and recommended discussion with COT attorneys and landscape advisory committee members about any TAC-based NPPO revision recommendations.

Sherry Barrett (USFWS) joined the meeting to help answer questions. She said that if any adopted ordinance provides adequate conservation, that ordinance is applied whether or not the COT has discretionary action. As far as applying the HCP, ordinances serve as tools for HCP implementation. So, protection measures would be built into a new ordinance or as part of a revision to an existing ordinance to the point that it provides the protection needed to meet the goals of the HCP. The COT then says that it will apply this ordinance on certain projects to be consistent with the HCP. Ann said that the NPPO or watercourse preservation ordinances could be revised then to meet the requirements of the HCP. Sherry agreed. She added that there are laws prohibiting the constraint of Mayor and Council future action. So, a future Mayor and Council will have the ability to change ordinances. However, significant changes could result in the revocation of the ESA Section 10 Incidental Take Permit. The HCP could rely on the NPPO as a conservation tool. If so, the HCP would need to describe how the NPPO will achieve conservation.

Sherry said that the COT could also rely on exactions. To explain this term, she used the example of someone who wants to change the zoning on her or his property. In this case, the decision of Mayor and Council is discretionary and thus, can involve exactions, such as road improvements in exchange for the rezoning. They can also require conservation as part of these rezonings. She used the example of Pima County requiring 80 percent set aside for new subdivisions. She said that the developer can be granted the increase in the allowable number of units as part of this subdivision, but, in exchange, she or he must set-aside this 80 percent. She said that if someone wants to build a house within a zone that allows 1 residence per 3.3 acres, then only administrative action – compliance with current City code – would be required. As long as the individual confirms to existing regulations, that person can do what he or she is entitled to do.

Sherry said that there needs to be an instrument for the COT to conform with the HCP, such as an ordinance, an exaction, or grading permit requirements. If the HCP states that an ordinance will be changed to meet the conservation measures, the ESA Section 10 Incidental Take Permit will not be granted until that ordinance is changed. Locana said it sounds like mitigation for the HCP must match the ordinances. Sherry said that conservation has to be built into COT processes. Trevor said that it is important that the TAC look closely at the COT's NPPO. He

asked if Pima County is considering revision to its NPPO to which Sherry replied, yes. She said that Sherry Ruther is the Pima County staff member working on this *[Action Item: OCSD staff ask Sherry Ruther of Pima County about the changes to Pima County's NPPO under consideration]*.

Sherry said that the way NPPOs are currently written, they deal with plants, not both plants and their habitat. She said that the NPPO needs to address habitat. She said that there might be aspects of the NPPO that can be relaxed, such as aesthetic issues, in exchange for bolstering habitat issues. Sherry said that there is a benefit if the NPPOs align across jurisdictional boundaries, not only for conservation, but also to make compliance easier for developers. She added that each jurisdiction may need to have differences in their respective NPPO, but it would be good if core issues were consistent among jurisdictions.

Sherry wondered if the Arizona State Land Department (ASLD) would consider disposing lands within the Greater Southlands HCP planning area in a way similar to what ASLD did as part of "Superstition Vistas." She said that this would involve working with the COT to develop a conservation plan and then disposing of all of this as one chunk. David said that he didn't know if this would be feasible, especially for the entire planning area. However, he said that perhaps it would be feasible for smaller chunks of land. Sherry asked if there were further questions and then left the meeting. Ann said that what she heard Sherry say is that it may be necessary for the COT to revise its ordinances to comply with the terms of the HCP. Locana said that she understands that the ordinances are the tools used to enforce the terms of the HCP.

Trevor said that the higher density PPC areas around the Swan Southlands are outside of the Pima County CLS. So, there is basically no set-aside there. In these areas outside of the CLS, the only way to protect some of the braided wash systems and adjacent uplands is to create natural parks.

Bob said that the Swan Southlands development has low PPC density at 1 plant per 10 acres. Trevor asked if Westland Resources, Inc. did the environmental work for the Swan Southlands. Bob said that he thinks Westland Resources, Inc. did portions of that work.

In terms of research questions, Trevor wondered if the Greater Southlands HCP should stay in draft form over the next 20 years until some of the research questions mentioned – not just related to PPC, but other species as well – are adequately answered.

Bob said that he appreciated the invitation to take part in the conversation and brainstorming. Trevor said that he thinks it is important that the TAC allow for all viewpoints to be heard.

5. Upcoming Meetings:

October 1: Adaptive Management. Rich said that in addition to Dennis Kubly, Glen Knowles from the U.S. Fish and Wildlife Service's Phoenix office would also present.

6. Call to the Audience

No members of the audience had comments

7. Adjournment

The meeting was adjourned at 3:30 p.m.

Summary of Action Items:

- OCSD staff provide information to the TAC on the amount of HCP grant funds available for surveys and studies;
- OCSD staff inquire with USFWS staff as to whether or not lands west of and adjacent to the Santa Rita Experimental Range have been surveyed for PPC;
- USFWS staff get information on the research questions the Swan Southlands PPC study – required by Pima County – seeks to answer;
- OCSD staff ask other COT staff if they have documentation or knowledge of the justification for the 4” diameter threshold used in the COT’s Native Plant Preservation Ordinance;
- OCSD staff ask Sherry Ruther of Pima County about the changes to Pima County’s NPPO under consideration.